



MBG*3660 Genomics

Winter 2020

Section(s): C01

Department of Molecular and Cellular Biology

Credit Weight: 0.50

Version 3.00 - April 22, 2020

1 Course Details

1.1 Calendar Description

This course examines the genomes of eukaryotes and prokaryotes including how genomes are mapped and sequenced, the function of the genome and ethical issues arising from genomic information. How genomic data is used for understanding and treating human disease and for the study of evolution will also be discussed.

Pre-Requisites: MCB*2050

1.2 Course Description

This course examines how genome projects are generated through mapping and sequencing. We will also examine the various information generated from eukaryotic and prokaryotic genomic projects, including transcriptomics, polymorphisms, proteomics. Finally we will explore how genomic data is used for understanding and treating human disease and for the study of evolution.

1.3 Timetable

Lectures are Tuesdays and Thursdays from 10:00 to 11:20 AM in CRSC 117

1.4 Final Exam

FINAL EXAM:

Wednesday, April 15, 2020

7-9pm

Room TBA

Note: Due to Covid-19, the final exam has been cancelled. Please see the Assessment for redistribution of marks.

2 Instructional Support

2.1 Instructional Support Team

| | |
|----------------------|----------------------------|
| Instructor: | Terry Van Raay |
| Email: | tvanraay@uoguelph.ca |
| Telephone: | +1-519-824-4120 x52864 |
| Office: | SSC 3247 |
| Office Hours: | Thursdays from 2:00-3:30pm |

3 Learning Resources

There is no required textbook for this course. However, I will be using information primarily from two textbooks, which will be on reserve in the library.

3.1 Recommended Resources

Discovering Genomics, Proteomics and Bioinformatics (Textbook)

- Discovering Genomics, Proteomics and Bioinformatics, 2nd Edition, by A. Malcolm Campbell and Laurie J. Heyer
- On reserve in the library

Genomes 3 (Textbook)

- Genomes 3, T.A. Brown
 - On reserve in the library
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4 Learning Outcomes

Overall, it is my objective for my students to have an appreciation and understanding of different 'omics' projects, be it population genomics, transcriptomics or proteomics.

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Describe the history of the human genome project.
2. Demonstrate the strategies involved in completing a genomics project.
3. Explain the different types of information that can be obtained from a genome project (eg., aneuploidy or genome evolution).

4. Challenge the ethical issues surrounding human genome projects and the concept of personalized medicine.
 5. Integrate different databases, such as a genome browser and its associated databases (eg. Human Genome Browser) with other databases (eg., Genbank), and synthesize the various elements displayed in these databases.
 6. Apply information gathered from databases to a gene of interest.
 7. Explain the basics of mass spec and its application to the 'omics' field.
 8. Understand the methods used to manipulate a genome.
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5 Teaching and Learning Activities

- This course will be run using CourseLink.
- Major course components:
 - Lecture
 - Computer Exercises
 - Individual Student project
 - Examinations
 - Student presentations

5.1 Schedule (Subject to Change)

| Week | Dates | Topics Covered in Lecture and Important Dates (tentative and subject to change) | Personal Presentation Numbers |
|-------------|---|--|--------------------------------------|
| 1 | January 7 th and 9 th | Introduction and Overview of Topics. Mapping: Genetic and Physical Maps | |
| 2 | January 14 th and 16 th | Mapping Huntington's Disease. Genome Sequencing Project | |
| 3 | January 21 st and 23 rd | Genome Annotation. Exploring the various genomic databases. | 1-5 |
| | Monday, January 27th | Assignment #1 due at 11:59pm in DropBox | |
| 4 | January 28 th and 30 th | What's in a genome? Finding genes and | 6-15 |

| | | | |
|----|--|---|-------|
| | | other stuff. Other genomic projects and Genome evolution. | |
| 5 | February 4 th and 6 th | Exploring the UCSC Genome Browsers. | 16-25 |
| 6 | February 11 th and 13 th | Genome Evolution and Prokaryotic genomes Prokaryote Genomes, Yeast genome. | 26-35 |
| 7 | February 25 th and 27 th | Microarrays. Midterm Exam Feb 27 | 36-45 |
| 8 | March 3 rd and 5 th | Aneuploidy and Proteomics. | 46-55 |
| 9 | March 10 th and 12 th | Manipulating the Genome. | 56-65 |
| | Monday, March 16th | Assignment #2 due at 11:59pm in DropBox extended to March 30 due to covid 19 | |
| 10 | March 17 th and 19 th | Quantitative Proteomics.: Cancelled due to covid 19 | 66-75 |
| 11 | March 24 th and 26 th | Metabolomics, Epigenomics...: Cancelled due to covid 19 | 76-85 |
| 12 | March 31 st and April 2 nd | Comprehensive Genomic analysis...: Cancelled due to covid 19 | 86-90 |

6 Assessments

6.1 Marking Schemes & Distributions

Scheme A was the original scheme used in which there was going to be a final exam. However, due to covid 19, Scheme B was instituted.

| Name | Scheme A (%) | Scheme B (%) |
|----------------------------|--------------|--------------|
| Assignment #1 | 10 | 14.3 |
| Genomics Midterm | 25 | 35.7 |
| Assignment #2 | 25 | 35.7 |
| Genomics Presentation | 10 | 14.3 |
| Final Exam (Comprehensive) | 30 | 0 |
| Total | 100 | 100 |

6.2 Assessment Details

Assignment #1 (14.3%)

Date: Mon, Jan 27

Learning Outcome: 2, 3, 5, 8

- Course Content:
 - Computer Exercises
 - Independent learning

Due to Covid 19, this item has been reweighted from the original 10% weight to 14.3%

Genomics Midterm (35.7%)

Date: Thu, Feb 27

Learning Outcome: 1, 2, 3, 4, 8

Due to Covid 19, this item has been reweighted from the original 25% weight to 35.7%

Assignment #2 (37.7%)

Due: due date extended to March 30 at 11:59

Learning Outcome: 2, 3, 5, 6, 7, 8

- Course Content:
 - Computer Exercises
 - Independent learning

Due to Covid 19, this item has been reweighted from the original 25% weight to 37.7%

Genomics Presentation (14.3%)

Date: During lecture throughout the semester

Learning Outcome: 2, 3, 5, 6

- Course Content:
 - Computer Exercises
 - Independent learning

Due to Covid 19, this item has been reweighted from the original 10% weight to 14.3%

Final Exam (Comprehensive) (0%)**Date:** Wed, Apr 15, 7:00 PM - 9:00 PM, TBA**Learning Outcome:** 1, 2, 3, 4, 7

- Course Content:
Lecture based material

Due to Covid 19, the final exam has been cancelled. This item has been reweighted from the original 30% weight to 0%

6.3 Important Dates

- Assignment #1: Monday, January 27th by 11:59pm in Dropbox
 - Midterm Exam: Thursday, February 27th in class
 - Assignment #2: Monday, March 16th by 11:59pm in Dropbox, updated to March 31 by 11:59
 - Final Exam: TBD-cancelled due to covid 19
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7 Course Statements**7.1 Late Assignments & Missed Presentations**

- Late assignments will be penalized 5 percentage points for every 24 hour period starting at 12:01 AM on the day after the assignment is due. For example, if an assignment is marked out of 55, then 2.75 marks will be deducted for every 24 hour period.
- Missed presentations will be deducted 2 points and rescheduled to the next lecture.

8 Department of Molecular and Cellular Biology Statements**8.1 Academic Advisors**

If you are concerned about any aspect of your academic program:

- Make an appointment with a program counsellor in your degree program. [B.Sc. Academic Advising](#) or [Program Counsellors](#)

8.2 Academic Support

If you are struggling to succeed academically:

- Learning Commons: There are numerous academic resources offered by the Learning Commons including, Supported Learning Groups for a variety of courses, workshops related to time management, taking multiple choice exams, and general study skills. You can also set up individualized appointments with a learning specialist.
<http://www.learningcommons.uoguelph.ca/>
- Science Commons: Located in the library, the Science Commons provides support for physics, mathematic/statistics, and chemistry. Details on their hours of operations can be found at: <http://www.lib.uoguelph.ca/get-assistance/studying/chemistry-physics-help> and <http://www.lib.uoguelph.ca/get-assistance/studying/math-stats-help>

8.3 Wellness

If you are struggling with personal or health issues:

- Counselling services offers individualized appointments to help students work through personal struggles that may be impacting their academic performance.
<https://www.uoguelph.ca/counselling/>
- Student Health Services is located on campus and is available to provide medical attention. <https://www.uoguelph.ca/studenthealthservices/clinic>
- For support related to stress and anxiety, besides Health Services and Counselling Services, Kathy Somers runs training workshops and one-on-one sessions related to stress management and high performance situations.
<http://www.selfregulationskills.ca/>

9 University Statements

9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
<https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml>

9.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.

Undergraduate Calendar - Dropping Courses
<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes
<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

Associate Diploma Calendar - Dropping Courses
<https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml>

9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

For Guelph students, information can be found on the SAS website
<https://www.uoguelph.ca/sas>

For Ridgetown students, information can be found on the Ridgetown SAS website
<https://www.ridgetownc.com/services/accessibilityservices.cfm>

9.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars

<https://www.uoguelph.ca/academics/calendars>
